10/4/17

"What you do today can improve all your tomorrows"-Ralph Marston

HW: "Fractional Exponents" back #38, 43, 48, 54, 59, 61, 64, 67, 71, 75, 78

Aim: What do Fractional Exponents tell us?

Warm Up:

Flip the fraction
switch the sign of exponent

Simplify:

$$\left(\frac{x^3}{y^2}\right)^{-1} = \left(\frac{y^2}{x^3}\right)^{1} = \frac{y^2}{x^3}$$

4) $2x^3 \cdot 2x^2 = \boxed{4x^5}$

6) $\dfrac{x^4}{x^7} = \boxed{\dfrac{1}{x^3}}$ (Battle, who wins?)

8) $-(9x)^0 = -(1) = \boxed{-1}$

14) $(2fg^4)^4 (fg)^6$

$(2^4 \cdot f^4 g^{4\cdot 4})(f^6 g^6)$

$(16 f^4 g^{16})(f^6 g^6) = \boxed{16 f^{10} g^{22}}$

18) $\left(\dfrac{5x^3y}{20xy^5}\right)^4 = \left(\dfrac{x^2}{4y^4}\right)^4$

$= \dfrac{x^{2\cdot 4}}{4^4 y^{4\cdot 4}} = \boxed{\dfrac{x^8}{256y^{16}}}$

20) $7^{-2} = \dfrac{1}{7^2} = \boxed{\dfrac{1}{49}}$

22) $\dfrac{1}{2^{-4}} = \dfrac{2^4}{1} = \boxed{16}$

27) $\dfrac{x^{-1}}{x^{-8}} = \boxed{\dfrac{x^7}{1}}$ Battle, who wins? $\dfrac{x^5}{x^3} = \dfrac{\cancel{x}\cancel{x}\cancel{x}xx}{\cancel{x}\cancel{x}\cancel{x}}$

35) $(4x^4y^{-4})^3 = 4^3 x^{4\cdot 3} y^{-4\cdot 3}$

$= 64x^{12}y^{-12}$

$= \boxed{\dfrac{64x^{12}}{y^{12}}}$

38) $\left(\dfrac{-2a^3b^2c^0}{3a^2b^3c^7}\right)^{-2} = \left(\dfrac{-2a}{3bc^7}\right)^{-2}$

$= \left(\dfrac{3bc^7}{-2a}\right)^2 = \dfrac{3^2 b^2 c^{7\cdot 2}}{(-2)^2 a^2}$

$= \boxed{\dfrac{9b^2c^{14}}{4a^2}}$

If $x \geq 0$ and n is a positive integer then:

(1) $x^{\frac{1}{n}} = \sqrt[n]{x}$ $\sqrt[3]{x} = x^{\frac{1}{3}}$

(2) $x^{\frac{m}{n}} = (\sqrt[n]{x})^m = \sqrt[n]{x^m}$

Think: $\dfrac{\textit{Power}}{\textit{Root}}$

(3) $\dfrac{x^{-\frac{m}{n}}}{1} = \dfrac{1}{(\sqrt[n]{x})^m} = \dfrac{1}{\sqrt[n]{x^m}}, x \neq 0$

$\dfrac{1}{x^{\frac{m}{n}}}$

1) $256^{\frac{1}{2}} = \sqrt[2]{256^1}$
$= \sqrt{256}$
$= 16$

2) $8^{\frac{1}{3}} = \sqrt[3]{8^1}$
$= \sqrt[3]{8}$
$= \boxed{2}$

5) $32^{-\frac{2}{5}} = \frac{1}{32^{2/5}} = \boxed{\frac{1}{\sqrt[5]{32^2}}}$

8) a) $(-27)^{\frac{1}{3}} = \sqrt[3]{-27^1}$
$= \boxed{-3}$

b) $-27^{\frac{1}{3}}$
$(-1)\,27^{1/3} = -1\sqrt[3]{27}$
$= -1(3)$
$= -3$

Rewrite each of the following using Rational Exponents:

1 ~~0~~a) $5\sqrt[2]{x^1} = \boxed{5x^{\frac{1}{2}}}$

1 ~~0~~b) $\sqrt[3]{(5x^2)} = (5x^2)^{\frac{1}{3}} = 5^{\frac{1}{3}}x^{2\cdot\frac{1}{3}} = \boxed{5^{\frac{1}{3}}\cdot x^{\frac{2}{3}}}$

1 ~~3~~c) $\sqrt[3]{(5x)^2} = (5x)^{\frac{2}{3}} = 5^{\frac{2}{3}}\cdot x^{\frac{2}{3}}$

1 ~~4~~d) $\sqrt[5]{(x^4y^3)^1} = (x^4y^3)^{\frac{1}{5}} = \boxed{x^{\frac{4}{5}}\cdot y^{\frac{3}{5}}}$